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Diagnostic radiography students' perceptions towards communication with service users who are deaf or hearing impaired

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ABSTRACT

Introduction: Communication issues can arise when deaf or hearing impaired individuals access National Health Service (NHS) radiology services if reasonable adjustments and inclusive services are not facilitated. This study aims to assess student diagnostic radiographers' attitudes and communication experience with service users who are deaf or hearing impaired.

Methods: An anonymous online survey was conducted on UK undergraduate diagnostic radiography students from a single university. The sample size of students invited to participate in the study was $n = 156$. The measurement scales and questions included quantitative attitudinal 5-point Likert and qualitative free-response questions. Statistical analysis included the Kruskal–Wallis H test, Mann–Whitney U test, pairwise comparisons of variables and thematic coding of qualitative data.

Results: n=48 students responded. The student's perceptions of communication experiences with deaf or hearing-impaired patients were positive (72.9%) but depended on the amount of experience whilst on clinical placement (first-year students had less clinical placement experience than years two and three). Overall confidence in communicating was 47.9% with no difference by gender ($p = 0.87$) but variance by age category ($p = 0.03$), with the 18–29 group less confident and first-year students having less experience to draw upon for responses ($p = 0.04$). Confidence in gaining consent (56.3%) demonstrated no variation by gender ($p = 0.75$) or cohort ($p = 0.54$), but variance by age category ($p = 0.03$) due to difference in unmatched sample sizes. Participants elaborated on positive service adaptations that can be facilitated for service users who are deaf or hearing impaired and issues that caused negative communication experiences.

Conclusion: The study has produced data on the experience of student radiographers interacting with an understudied service user group who are deaf or hearing impaired. Qualitative responses discussed a range of resources to assist clinical practice communication and recommendations for further improvements and training opportunities.

Implications for practice: The findings of this study can help to inform future research, policy, practice, and educational training.

Introduction

Within the United Kingdom (UK), there are 11 million people that are deaf (profound hearing loss[1]) or hearing impaired (loss of 20–35 dB[1]), and 151,000 users of sign language.[2] When these individuals access National Health Service (NHS) radiology departments, communication difficulties with identification, consenting and positioning can occur.[3] Clear communication is vital to achieve the best imaging possible and ensure the safety of staff and service users when working with radiation. Likewise, communication is essential for gaining consent from service users before examinations which is a legal requirement outlined in the Ionising Radiation (Medical Exposure) Regulations (IR (ME)R).[4] Radiographers should always provide service users with patient-centred care, with the individual's specific health needs and choices focused upon.[5]

Additionally, ensuring service users feel safe and understand examination instructions is an integral part of the Health and Care Professions Council (HCPC) Standards of Proficiency for

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Radiographers[6] who must be able to "adapt practice to meet the needs of different groups and individuals".[6]

Service users who are deaf or hearing impaired can be vulnerable members of society with complex care needs, and the Equality Act[7] states it "does not require public bodies to treat everyone the same. Rather, it requires public bodies to think about people's different needs and how these can be met".[7] Thus, radiology services should be "appropriate and accessible to all and meet different people's needs, by understanding the effect of their activities on different people".[7]

There are many ways that people who are deaf can communicate; this includes sign language, sign-supported English, lip-reading and hearing aids or implants. However, when these means of communication or other needs of deaf service users are not facilitated within healthcare services, it can impact the patient experience at the individual level[1] from a lack of understanding[8] leading to frustration,[1,3] social isolation, loneliness and stigmas.[1]

Literature review

There is limited published radiography research exploring communication with service users who are deaf or hearing impaired. Seventeen years ago, Davies and Channon[9] undertook interviews in an English radiology department with radiographers and deaf service users and highlighted communication problems in informed consent not being given and problems providing cross-sectional imaging instructions for breathing and positioning.

A more recent American nursing study by Barber[10] explored the cultural beliefs of deaf people and information on communicating and making accommodations for deaf service users. Barber[10] reported that healthcare workers and students provided more appropriate care once they were introduced to the patient-centred needs of deaf service users. Yuksel and Unver[11] further researched nursing students' simulation-based training to improve communication with deaf service users in a Turkish hospital. Yuksel and Unver[11] key findings recommend training on body language, speech speed, eye contact and patient preferences to improve communication skills.

Within England, the National Institute for Health and Care Excellence (NICE)[12] guidance outlines healthcare professionals should "ensure that factors such as … hearing problems … and understanding or speaking English are addressed so that the patient can participate as fully as possible in consultations and care".[12] Despite this, no specific guidance has been published on managing deaf service users within radiology departments. Additionally, communication with deaf and hearing impaired patients has been challenging during the Covid-19 pandemic, with the additional barriers of Personal Protective Equipment (PPE) of face masks hiding lip movements and muffling speech.[8]

This study aimed to assess student diagnostic radiographers attitudes and experience towards communication with service users who are deaf or hearing impaired. Student radiographers perceptions and experiences are ideal to gain a key insight into English NHS radiology departments and university pre-qualification training, preparation, and interaction with deaf or hearing impaired service users. Equally, radiographers need to be equipped to communicate with these patient groups once they are qualified; thus, student radiographers views can provide a range of ethnographic experiences to draw from and explore ways to improve the experience for this minority group.

Methods

A cross-sectional survey was conducted on a sample (n = 156) of English undergraduate diagnostic radiography students from a single university. The survey tool (included in the supplementary material) included four consent questions, three demographic questions, and eleven student experience questions exploring both positive and negative experiences and interactions with deaf or hearing impaired patients. The format included quantitative attitudinal 5-point Likert ordinal measurement scales to allow responses to be compared across and within the demographic variables for patterns and relationships within the student experience data. The survey also acquired qualitative student experience data from free-response questions to explore uncontrolled variables (influences of unknown size on the results).

Along with the survey, participants were provided with an information sheet explaining the study background, inclusion/exclusion criteria, consent, how to ask questions, how to withdraw, what anonymised data would be collected (gender, age and cohort), and the participant's rights.[13] The survey was set not to allow participants to complete the survey without first completing the consent form.

Surveys as a data collection method are quick and efficient to administer[14] however, issues can arise with participant fatigue and incomplete responses, so the survey had an estimated completion time of 4 min. A pilot of the survey was emailed to n = 3 university lecturer volunteers who checked the content validity, terminology, balance, order and grouping of questions, starting with broad 'awareness' of the subject before funnelling to specific behavioural and experience responses. The pilot feedback led to amendments, including age categories (an additional category for any students older than the estimated highest aged student) and the experience question scales, which had the "neutral" option replaced with "no experience" to assist the data analysis of responses.

The recruitment was conducted between January and March 2020 through university email and Blackboard (Virtual Learning Environment). The recruitment invites included a link to the participant information form and survey using Microsoft Forms (USA, 2021). A copy has been included in the supplementary material. Approval for the study was obtained from the universities research ethics committee (ETH2122-S19/RPR/07).

The quantitative data used inferential statistical non-parametric analysis of the Kruskal–Wallis H test (one-way ANOVA on ranks) to assess for statistically significant ($\leq p = 0.05$) differences between three or more independent groups (age of participants and cohort year groups) with different distributions, using SPSS statistics (V27.0.1; IBM, UK, 2022). For gender, the non-parametric Mann–Whitney U test (Wilcoxon) for a difference ($\leq p = 0.05$) in scoring tendencies between two independent groups was used.

The qualitative data analysis of survey transcripts was downloaded into a Microsoft Excel (V.2206; US, 2022) codebook and then imported into NVivo (V.12.6.1.970 Pro; QSR International; Australia, 2018). The thematic analysis[15] used an inductive approach (allowing the data to determine the themes) to identify, analyse and interpret common and recurring trends and code these to the found themes and number of instances reported. Both authors independently performed the quantitative and qualitative data analysis and then checked the findings together to confirm the results and eliminate bias.

Results

There were n = 48 responses received, with a 2:1 response rate of females (67%) to males (31%). The largest responses came from the age banding of the 18–29 category (58.3%) and third-year students 43.7%, a full breakdown of participants is provided in Table 1.

Table 1
Demographics of the participant's gender, age and year of study.

Variables	Levels	$n = 48$	%
Gender	Female	$n = 32$	66.6%
	Male	$n = 15$	31.3%
	Non-Binary	$n = 0$	0%
	Not disclosed	$n = 1$	2.1%
Age	18–29	n = 28	58.3%
	30–39	$n = 7$	14.6%
	40–49	$n = 10$	20.8%
	50–59	$n = 2$	4.2%
	>59	$n = 0$	0%
	Not disclosed	$n = 1$	2.1%
Cohort	Year 1	$n = 18$	37.5%
	Year 2	$n = 9$	18.7%
	Year 3	$n = 21$	43.8%
	Not disclosed	$n = 0$	0%

Frequency of interactions with deaf or hearing impaired patients whilst on clinical placement

Over 89% of participants (had one or more interactions with deaf or hearing impaired patients, with 41.7% having four or more interactions whilst on clinical placement (Fig. 1; Supplementary Material Table 1).

The Mann–Whitney analysis calculated no significant difference in responses by gender ($p = 1.00$). The Kruskal–Wallis test demonstrated no significant difference in the frequency of interactions with deaf or hearing impaired patients within and between student age categories ($p = 0.39$), cohort year groups ($p = 0.54$), or in pairwise comparisons (Supplementary Material Table 2).

Experiences working with deaf or hearing impaired patients categorised as positive or negative

The student's perceptions of communication experiences with deaf or hearing impaired patients were positive (72.9%; Fig. 2). The Likert attitudinal scoring inferred an equal direction of scoring between gender, age, and cohort. Statistical analysis of gender using the Mann–Whitney U Test demonstrated no significant difference in responses by gender ($p = 0.52$). The Kruskal–Wallis test for age ($p = 0.79$) displayed no significant difference in age. However, the Kruskal–Wallis results demonstrated a difference between cohort year groups ($p = 0.02$), with pairwise comparisons highlighting first-year responses of limited clinical experience compared to the second and third-year cohorts (Supplementary Material Tables 3 and 4).

The qualitative thematic analysis identified lip-reading (20.8%); speaking louder for hearing impaired patients (20.8%); miming and hand signals (16.7%); the use of sign language (14.5%); writing (4%). The use of interpreters (4%); the use of hearing aids (2%) and speech-to-text mobile phone applications (2%); were helpful in interactions concerning communication (20.8%); positioning (10.4%), and consent issues (2%). Positive responses included:

> *"Initially difficult, but once established hearing difficulties, I was able to speak louder and use hand body language to communicate or pull down the mask so service users can see lips and mouth movement." SR37*

Negative response examples involved PPE masks due to Covid-19 that affected lip-reading (18.8%), with some resorting to clear face shields to improve communication.

> *"I wasn't sure what else I could do other than speak louder (with hearing impaired service users), and this was frustrating both for me and the service user." SR10*

> *"I have noticed that there aren't as many inclusive PPE for the hard of hearing which can be a real challenge." SR23*

Confidence in communicating effectively with deaf or hearing impaired patients

The combined agreed and strongly agreed Likert attitudinal scores demonstrated that 47.9% of participants felt confident in their communication skills (Fig. 3, Supplementary Material Table 5). The Mann–Whitney analysis demonstrated no difference ($p = 0.87$) in confidence by gender (Supplementary Material Table 6). The Kruskal–Wallis result displayed a difference in age category responses of 18–29 versus 40–49 and 50–59 ($p = 0.03$), with 35.7% of the 18–29 age group disagreeing on confidence. Pairwise comparisons noted first-year cohort students scored disagreement on confidence more often (33.3%; $p = 0.04$) compared to second-year and third-year students (Supplementary Material Table 6).

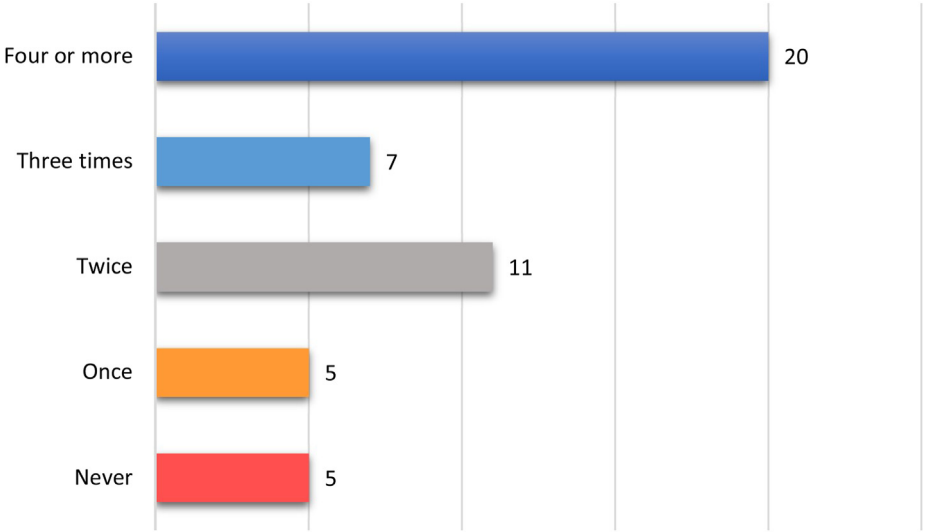

Figure 1. How frequently have you interacted with deaf or hearing impaired patients whilst on clinical placement?

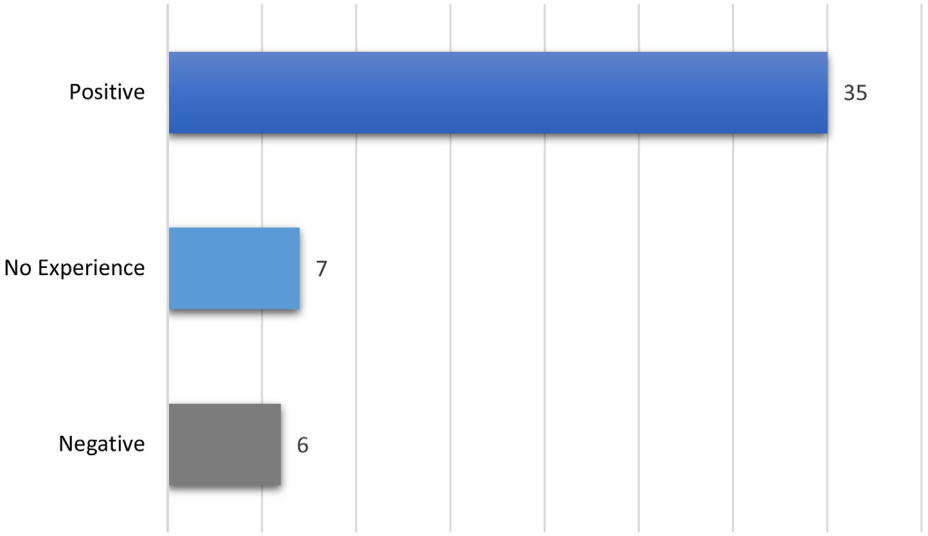

Figure 2. Have your experiences working with deaf or hearing impaired patients been positive or negative?

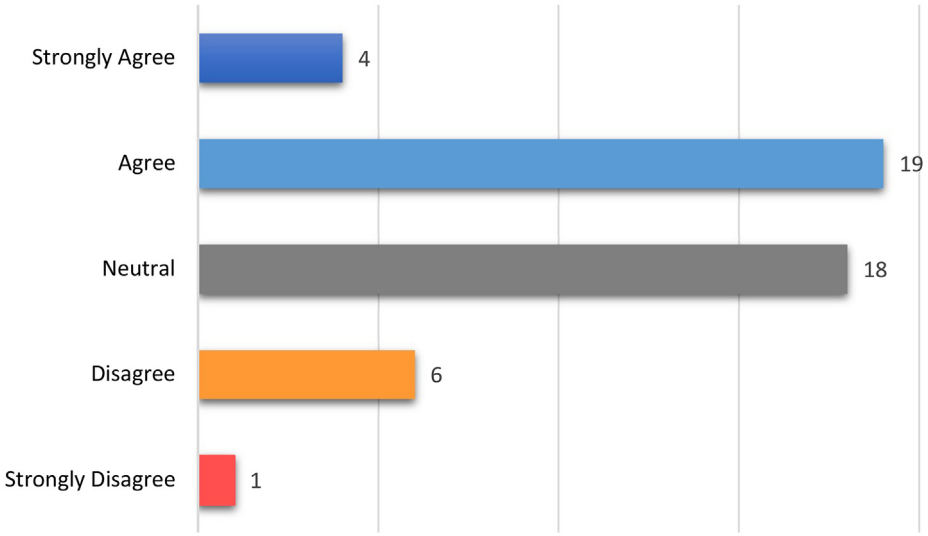

Figure 3. Confidence in communicating effectively with deaf or hearing impaired patients.

The range of qualitative responses reported positive themes of confidence (18.8%), capability (2%), and feeling comfortable (2%), with some having sign language skills (6.2%) and Makaton skills (2%). The main themes that influenced the participants' confidence level were the amount of experience students had communicating with deaf service users.

Some student responses contained mixed feelings and uncertainties due to the lack of enough experience to feel confident (8.3%), with others unsure (4%), uncertain (2%), and not comfortable (2%).

> *"Until I am faced with a service user who is deaf, it is difficult for me to say how confident I would feel." SR1*

> *"I haven't yet had enough experience and don't know the best ways to communicate with these service users well." SR35*

> *"From my very limited experience, it has seemed to depend on the service users' ability to communicate with us, which is obviously the wrong way for it to be." SR6*

Confidence in gaining informed consent from deaf or hearing impaired patients

Students' confidence in gaining informed consent was 56.3% (agree and strongly agree combined in Fig. 4, Supplementary Material Table 7) with no statical difference under Mann–Whitney between gender ($p = 0.75$; Supplementary Material Table 8). The Kruskal–Wallis demonstrated a significant difference ($p = 0.04$) in the agreement and neutral responses between age bandings, with pairwise comparisons identifying differences between the age categories of 18–29 and 50–59s ($p = 0.00$); and 30–39 and 50–59s $p = 0.01$ (Supplementary Material Table 8). With the cohort subcategory level responses fairly matched at $p = 0.54$.

The qualitative responses highlighted the need for respect and dignity of the service user at all times, with recurring themes on written consent forms (56.3%); sign language (41.7%); physically inferred consent (25%); use of interpreters to confirm consent (22.9%); hearing loop aids (4%); speech to text mobile phone

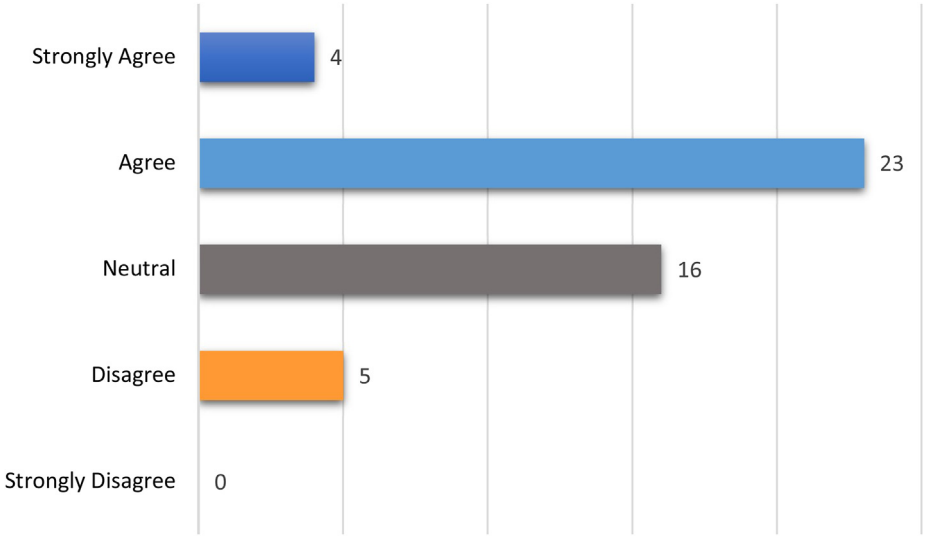

Figure 4. Confidence in gaining informed consent from deaf or hearing-impaired patients.

applications (4%); and pictures (4%). The participants also highlighted that diagnostic radiography students do not receive specific training during their course on how to communicate with service users who are deaf or hearing impaired.

> *"I feel that I am capable, though we do not receive training about how to address situations like this." SR14*

> *"If a service user was deaf and required a chest x-ray, they face away from you, so I wouldn't know how to give breathing instructions if they can't hear you." SR28*

Observations and awareness of how radiology departments can accommodate deaf and hearing impaired patients

Inclusive service approaches to gain informed consent reported in qualitative responses included written information and patient-centred care forms (18.8%); staff able to provide sign language (10.4%); interpreters (10.4%); hearing aid loops (4%); and visual aids and picture cards (4%).

> *"Writing down the questions - assumption of literacy, interpreter for a profoundly deaf service user (if accompanying or available), speaking slower and more clearly, facing the service user to allow them to lip read, but the mask will have to be temporarily removed" SR5.*

Participants also reported that they had not observed or were aware of any accommodations in their departments.

> *"I don't know of any of the ways the hospital I am based at accommodates deaf service users. This is certainly something I will ask about when next on placement so as to provide an inclusive service." SR1*

> *"I would have presumed there would be a flashcard with common requests/questions or portable hearing aid loop systems for those who use hearing aids, but I had seen none on placement." SR34*

Descriptions on facilitating improvements in communication with deaf and hearing impaired patients in radiology departments

Participants' qualitative responses recommended the implementation of formalised staff training on sign language (68.8%); better quality inclusive written materials (20.8%); visual picture cards explaining instructions (12.5%); better availability of portable hearing induction aid loops (6.2%). The opportunity for Covid-19 PPE masks that provide an inclusive clear face shield to allow lip reading (4%); better access to interpreters (2%); hard of hearing awareness courses (2%), and the potential for each hospital to have a dedicated disability/impairment radiographer (2%).

> *"Have standard questions printed out and laminated. Have simple diagrams of positioning/explanations of what will be required printed and laminated. Have more information in letters prior to imaging. Training for all staff, even if it's just 'Hello, my name is … ' in sign language. Use clear masks to allow faces and mouths to be seen." SR5*

> *"CPD for staff in using sign language and or Makaton." SR24*

> *"Provide opportunities for sign language courses and workshops to be available to students." SR39*

Confidence in safe working abilities with deaf and hearing impaired patients

The combined student agree and strongly agree Likert attitudinal responses for confidence in working with deaf and hearing impaired patients were 70.8% (Fig. 5, Supplementary Material Table 9). Statistical analysis between and within variables displayed a difference in attitudes by gender ($p = 0.04$), with females scoring less confident (62.5%) on average than males (86.6%; Supplementary Material Table 10), although caution is highlighted to this finding due to the disparity of sample sizes in the comparison. The Kruskal–Wallis result, further analysed in pairwise comparisons, indicated no difference in confidence scores by age category ($p = 0.39$) or cohort group ($p = 0.30$).

Ability to communicate with sign language

The combined student agree and strongly agree responses demonstrated only 14.6% (Fig. 6, Supplementary Material Table 11) of students within the study could communicate using sign language. The Mann–Whitney ($p = 0.06$) and Kruskal–Wallis results ($p = 0.30$; $p = 0.40$) and pairwise comparisons within and between

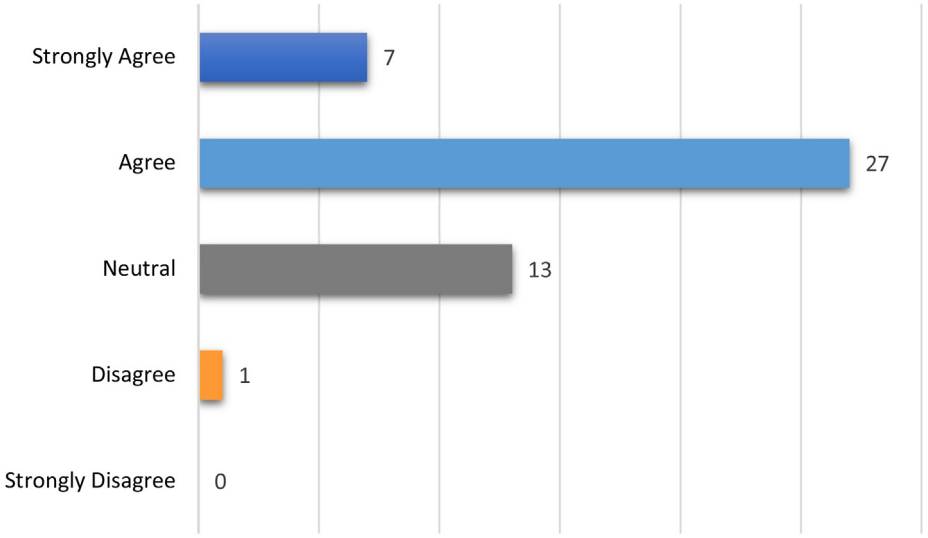

Figure 5. Confidence in safe working abilities with deaf and hearing impaired patients.

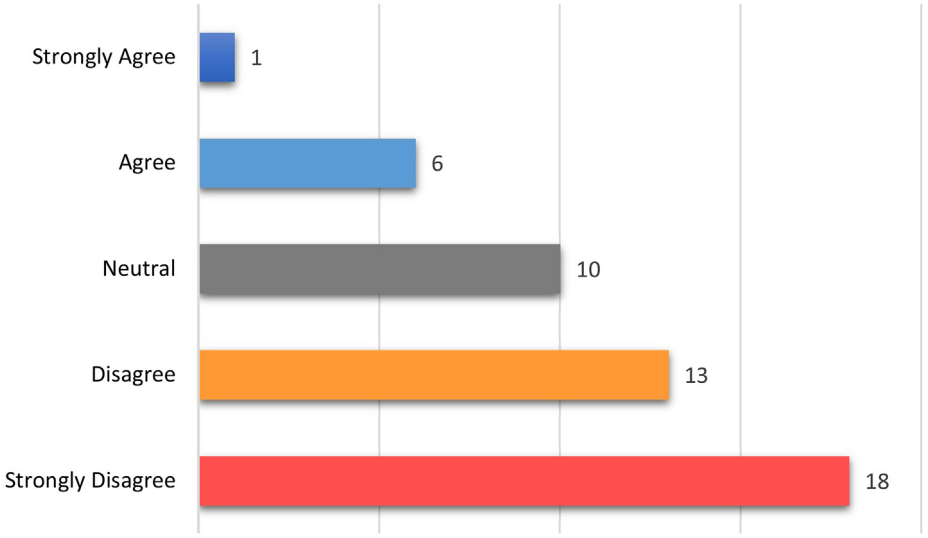

Figure 6. Ability to communicate with sign language.

gender, age and cohort displayed no significant difference (Supplementary Material Table 12).

Discussion

The findings observed that 89.6% of students had at least one interaction with deaf or hard of hearing service users, with 41.7% of students having four or more interactions. Of these interactions, 72.9% of students felt that their previous communication experiences with deaf or hearing impaired patients had been positive. However, first-year students had less clinical placement experience than students in years two and three, with 27.8% of first-year students having no experience at the time of the survey of working with deaf or hearing impaired patients.

These results are similar to Yuksel and Unver[11] who identified that nursing students' confidence levels in communication with deaf service users depended on the amount of clinical experience they had. Yuksel and Unver[11] recommended that simulation training can be an effective learning tool for developing communication with this patient group. Using simulation to improve radiography students' communication skills with deaf service users incorporating sign language could be beneficial as students had limited knowledge and experience in sign language skills (14.6%) in this study.

The responses demonstrated the range of technology that can aid in reducing communication barriers between deaf individuals and healthcare practitioners, especially important as only a small amount of student radiographers in this sample (14.6%) could communicate using sign language. One participant recalled using a mobile application to facilitate communication, *"The service user had an app on their phone that they instructed the Radiographer to talk into. It was a speech-to-text app that the radiographer could then rest on the bucky and talk to the service user from behind the lead screen."* The use of mobile applications can be an easier and faster way to access interpretation services.[16] There are several e-health smartphone transcription applications currently being trialled in the NHS[17–20] with ongoing review by NHS Digital[21] through the Digital Technology Assessment Criteria (DTAC)[22] assessments to confirm security, technical, clinical and governance checks and UK data laws.[13]

The findings demonstrated that 56.2% of students used lip reading as an additional communication method, similar to the research by Davies and Channon.[9] However, Davies and Channon[9] recommended being cautious when relying upon lip reading as they observed that radiographers may overestimate the number of words that deaf or hearing impaired service users understand from lip reading. However, to assist the UK government[23] is introducing clear face masks (PPE) to assist lip-reading communication for staff within the NHS as part of its ongoing response to the Covid-19 pandemic, as well as making the exemption of face masks for service users who rely on lip reading to communicate.[24]

Responses for gaining informed consent from service users demonstrated that 10.4% of participants were unconfident, and 33.3% were unsure of their consenting ability with this patient group. This is a fundamental legal requirement that practitioners must obtain from service users before examinations (IR(ME)R).[4] For service users to give informed consent, the UK Society of Radiographers[25] states that service users "should have all the information they require to make a decision and should be able to do so voluntarily, without pressure from external influences. They will need to be aware of the nature and purpose of any treatment/examinations and all relevant benefits and risks that may be important to them".[25]

The results of this study identified that not all diagnostic radiography students in this sample were aware of all the accommodations that can be made for deaf or hearing impaired service users within radiology departments. If the service is not adapted for service users with complex needs, they could be receiving a lower quality of care that is not patient centred. Deafness is a protected characteristic as a disability, with protected rights under the Equality Act[7] to stop discrimination and provide equal opportunities and reasonable adjustments. Furthermore, the NHS constitution states all service users have the right to be involved in discussions and to be given the information needed to make decisions.[26]

As highlighted in the results, not all students had experienced how departments facilitate deaf service users, which can lead to a loss of confidence and ability to support deaf or hearing impaired service users. These results identify the need for theoretical learning and simulated practice scenarios to learn communication skills to prepare students for clinical practice.

The findings are limited by the sample of one university programme of students and the sample size of responses within each demographic category and are unable to establish broader inferences about student radiographers as a population. Further research is required into the subjective determinants of student radiographers attitudes and experiences interacting with this minority group in clinical practice.

Conclusion

The study has explored the experience of student radiographers interacting with an understudied service user group who are deaf or hearing impaired. The results identified that the confidence level (48%) of student diagnostic radiographers communication ability depends on the amount of clinical placement experience and interaction with this service users' group. Not all participants were aware of the provisions and service adaptations that can be facilitated for service users who are deaf or hearing impaired. Key findings highlighted the need for further training for student radiographers on adaptions to communication, specifically for consenting, the use in clinical practice of sign language, and clear PPE masks. Additionally, dictation or translation mobile phone applications may be beneficial for inclusive patient-centred care and communication.

The study's findings can help inform further larger-scale research on the role of student radiographers interacting with service users who are deaf or hearing impaired and also inform policy, practice, and education on the subject. Future research should be inclusive of patient and public involvement from the deaf and hard of hearing community to guide patient-centred improvements.

Conflict of interest

There are no conflicts of interest.

Acknowledgements

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.radi.2022.11.008.

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